Tools for Better SLM Knowledge Management and Informed Decision-Making in Addressing Land Degradation at Different Scales: The WOCAT–LADA–DESIRE Methodology

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ABSTRACT: Desertification research conventionally focuses on the problem – that is, degradation – while neglecting the appraisal of successful conservation practices. Based on the premise that Sustainable Land Management (SLM) experiences are not sufficiently or comprehensively documented, evaluated, and shared, the World Overview of Conservation Approaches and Technologies (WOCAT) initiative (www.wocat.net), in collaboration with FAO's Land Degradation Assessment in Drylands (LADA) project (www.fao.org/nr/lada/) and the EU's DESIRE project (http://www.desire-project.eu/), has developed standardised tools and methods for compiling and evaluating the biophysical and socio-economic knowledge available about SLM. The tools allow SLM specialists to share their knowledge and assess the impact of SLM at the local, national, and global levels. As a whole, the WOCAT–LADA–DESIRE methodology comprises tools for documenting, self-evaluating, and assessing the impact of SLM practices, as well as for knowledge sharing and decision support in the field, at the planning level, and in scaling up identified good practices. SLM depends on flexibility and responsiveness to changing complex ecological and socio-economic causes of land degradation. The WOCAT tools are designed to reflect and capture this capacity of SLM. In order to take account of new challenges and meet emerging needs of WOCAT users, the tools are constantly further developed and adapted. Recent enhancements include tools for improved data analysis (impact and cost/benefit), cross-scale mapping, climate change adaptation and disaster risk management, and easier reporting on SLM best practices to UNCCD and other national and international partners. Moreover, WOCAT has begun to give land users a voice by backing conventional documentation with video clips straight from the field. To promote the scaling up of SLM, WOCAT works with key institutions and partners at the local and national level, for example advisory services and implementation projects.

Keywords: Sustainable Land Management (SLM), knowledge management, decision-making, WOCAT–LADA–DESIRE methodology.

1. INTRODUCTION

Desertification, land degradation, and drought affect more than 2 billion people, and the situation might worsen due to unsustainable use of soil and water under present scenarios of climate change (Gabathuler et al., 2009). The issue of desertification has been on the global agenda for many years, even before the inception of the UN Convention to Combat Desertification in 1994. Desertification is defined as "land degradation in arid, semi-arid, and dry subhumid areas resulting from various factors, including climatic fluctuations and human activities" (UNCCD, 1994). Now perceived as a global challenge, desertification – together with climate change and biodiversity – is being addressed by a strong global coalition of partners (MA, 2005; UNCCD, 2008; Cowie et al., 2011).

Disturbances in dryland ecosystems can easily result in widespread and severe land degradation and thus desertification. Combined with global issues such as climate change, economic disparities, migration, and competing claims on land, this often leads to a vicious cycle of aridity, loss of water, land degradation, and productivity decline, affecting the well-being of people living in drylands (MA, 2005). Maintaining and improving the productivity of agricultural land in order to enhance food security and ecosystem sustainability is therefore a key concern for drylands (Hurni et al., 2008; Thomas, 2008; Wegner and Zwart, 2011). However, despite this heightened attention and long-standing efforts and investments in prevention, mitigation, and rehabilitation, the problems of desertification persist. The recent *The State of the World's Land and Water Resources for Food and Agriculture* report (FAO, 2011) estimates that 32% of all land is affected by moderate to severe degradation, requiring intervention in terms of rehabilitation or mitigation measures. According to the Millennium Ecosystem Assessment (MA, 2005), 10–20% of drylands are already degraded, and over 250 million people are directly affected by desertification.

Desertification research conventionally focuses on the problem – that is, degradation – while neglecting the appraisal of successful conservation practices. A wealth of knowledge and information about Sustainable Land Management (SLM) exists, but much of it remains untapped. The challenge is to make this knowledge available for exchange between land users and SLM specialists. The UNCCD 10-year strategy points out the importance of science, knowledge sharing systems, and awareness raising when it comes to supporting policymakers in reversing the negative trend (UNCCD, 2008). SLM practices provide important local, regional, and global benefits. They also contribute to fundamental ecosystem services such as regulating water cycles, sequestering carbon, and helping to preserve agro-biodiversity (UNCCD, 2009).

Based on the premise that SLM experiences are not sufficiently or comprehensively documented, evaluated, and shared, the global World Overview of Conservation Approaches and Technologies (WOCAT) initiative (www.wocat.net), in collaboration with FAO's Land Degradation Assessment in Drylands (LADA) project (www.fao.org/nr/lada/) and the EU's DESIRE project (http://www.desire-project.eu/), has developed standardised tools and methods for compiling and evaluating the biophysical and socio-economic knowledge available about SLM.

This contribution presents the various WOCAT–LADA–DESIRE tools, outlining their application and use in decision support and decision-making at both the field and the planning levels.

2. WOCAT–LADA–DESIRE TOOLS

The WOCAT–LADA–DESIRE tools allow SLM specialists (including land users, agricultural advisors, project managers, government officers, and others) to assess the impact of SLM and land degradation and share their knowledge at the local, national, and global levels. Thus, the WOCAT–LADA–DESIRE methodology comprises tools for documenting, self-evaluating, and assessing the impact of SLM practices, as well as for knowledge sharing and decision support in the field, at the planning level, and in scaling up identified good practices. Figure 1 gives an overview of the different tools and shows how they relate to each other. The WOCAT network is an ongoing long-term initiative launched 20 years ago, whereas LADA and DESIRE were projects with a limited duration.

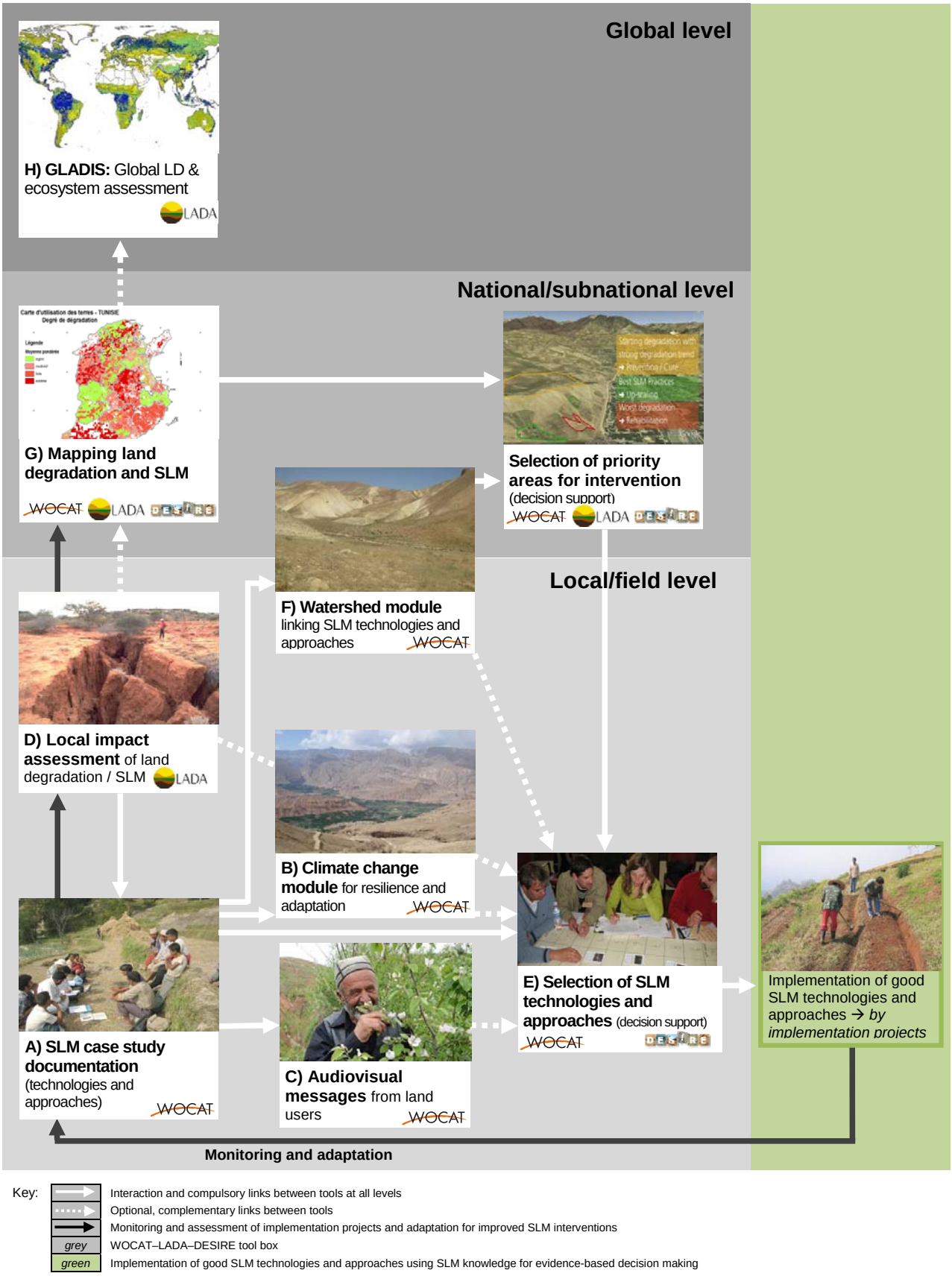

Fig. 1: A tool box for SLM knowledge management and decision support: the WOCAT–LADA–DESIRE tools and methods and how they can be applied at the local, national, and global levels

2.1 Tools at the local/field level

Four different WOCAT–LADA–DESIRE tools exist for use at the local/field level. They complement and build on each other (Figure 1).

A) WOCAT developed the standardised **WOCAT case study questionnaires** to document and evaluate SLM technologies and SLM approaches, and set up a database to store this knowledge. One SLM technology and one SLM approach applied together constitute a *case study*, which can cover any area from as little as one farmer's field to hundreds of square kilometres (catchments, districts, etc.) (Schwilch et al 2011). Over the last 15 years, the global database has grown to about 470 technologies and 240 approaches from all continents, with particularly large numbers of case studies from Africa and Asia.

B) A recent development is the **WOCAT climate change module**, which builds on SLM technologies and approaches (as documented using the standardised WOCAT questionnaires) and evaluates them in the context of climate change. The main question is how resilient or how vulnerable technologies are to climate change. This new tool has been tested and refined in Tajikistan.

C) Based on data from the growing global WOCAT database, SLM practices have been presented in an attractive standardised soft- and hardcopy format (Liniger and Critchley, 2007; Liniger et al., 2011). What has been missing so far, however, were informative **audiovisual messages from land users to land users** showing how SLM works, what problems it solves, how challenges can be overcome, and what benefits can be achieved locally, regionally, and globally. Therefore, WOCAT has recently begun to give land users a voice by backing text and photo documentation with video clips straight from the field (Liniger and Harari, 2013).

D) FAO's LADA project developed a method to complement WOCAT case study documentation at the local level: the **LADA local-level impact assessment methodology**, or 'LADA Local', for assessing and measuring the impacts of degradation and SLM at the field level. The LADA Local manual outlines how to conduct field observations and measurements of land degradation and SLM indicators, as well as interviews with land users and key informants. It highlights the need to build on available secondary information, including remote sensing images and maps, statistics, research, and case studies, and offers guidance on how to analyse and report on the findings using a combination of the DPSIR, sustainable livelihoods, and ecosystems services frameworks, which help to explore the complex human–environment interactions. LADA Local has been applied in the six LADA pilot countries Argentina, China, Cuba, Senegal, South Africa, and Tunisia.

E) Within the EU-funded DESIRE project, researchers developed a decision support framework for **selecting SLM practices** at the local level (Schwilch et al., 2009). The DESIRE approach builds on the standardised WOCAT questionnaires and database and consists of three parts: initial joint identification of problems and existing SLM solutions in a first stakeholder workshop (Part I); evaluation and documentation of the identified locally available SLM technologies and approaches (Part II); and selection of the most promising SLM options for subsequent field trialling in a second stakeholder workshop, using a decision support tool (Part III) (Schwilch et al., 2012). The DESIRE decision support framework has been implemented in 17 subnational dryland study sites around the world, and has recently been further developed and applied in a watershed management project in Tajikistan.

2.2 Tools at the national/subnational level

At the national and subnational level, tools for spatial monitoring and assessment of SLM and land degradation are needed to support decision-making, as well as to demonstrate the need for, and the benefits of, SLM interventions. Two complementary methods for spatial monitoring and assessment were recently developed in response to this demand.

F) The **WOCAT watershed module** combines single case studies of SLM technologies and approaches (documented using the standardised WOCAT questionnaires) within a watershed and assesses the combined impacts and benefits. This facilitates the assessment of off-site impacts and effects of upstream interventions on downstream areas. The resulting knowledge is highly relevant, as it provides a basis for focusing interventions more on prevention upstream than rehabilitation of already degraded land downstream, and hence for minimising the design and costs of downstream interventions. This applies not only to impacts caused by water flowing downstream, but also to off-site impacts caused by wind (e.g. dust storms). The watershed module has so far been tested only in one watershed in southern Tunisia and in Nepal.

G) The (sub)national **mapping methodology** jointly developed by WOCAT, LADA, and DESIRE generates information on land degradation and SLM as a basis for identifying suitable areas for investment within a smaller or larger region. It further supports assessment of whether it is preferable to prevent or to cure land degradation, and of each option's impacts on ecosystem services. The mapping methodology covers the following three aspects for each land use system within an administrative unit or watershed: 1) area covered and intensity trend, 2) types, extent, causes, and impacts of degradation, and 3) conservation/SLM practices and their extent, effectiveness, and impacts. The data is compiled in the course of a participatory expert assessment that includes local land users and is supported by documents and surveys. The mapping tool has been tested and applied in 6 LADA pilot countries, in 17 catchments in 14 countries within the EU's DESIRE project, and in additional projects in Eastern Africa and Mongolia (Liniger et al. 2013).

2.3. Tools at the global level

H) In order to improve the ability to diagnose land degradation problems and their impacts, the LADA project developed a **Global Land Degradation Information System (GLADIS)** as a reference system and a basis for illustrating how ecosystem services change due to human actions and natural processes. GLADIS covers the following six parameters: biomass, soil health, water availability, biodiversity, economic benefit and social benefit (http://www.fao.org/nr/lada).

3. USE OF WOCAT–LADA–DESIRE TOOLS FOR KNOWLEDGE MANAGEMENT AND DECISION SUPPORT

Using the WOCAT–LADA–DESIRE tools stimulates self-evaluation and encourages learning by comparing experiences within SLM initiatives. All too often, SLM initiatives lack not only sufficient monitoring but also critical analysis. Successful SLM depends on flexibility and responsiveness to changing complex ecological and socio-economic causes of degradation, as well as on analysis of what works and why, and how practices can be modified and adapted to specific local circumstances and opportunities. Furthermore, SLM experiences documented using the WOCAT–LADA–DESIRE toolbox serve as a basket of options for land users, advisors, and planners. The advantages and disadvantages of each option are highlighted, thereby enabling users to make informed choices. The implementation of new SLM efforts should build on existing knowledge from within a location itself or, alternatively, from similar conditions and environments elsewhere.

To date, WOCAT has carried out its activities together with more than 50 national and regional groups, documenting about 470 SLM technologies and 240 SLM approaches and training more than 500 practitioners in applying the corresponding methods and tools. Various projects and programmes – including LADA and DESIRE – have used the WOCAT tools to document their own case studies in different countries and at the same time benefitted from using the WOCAT knowledge base.

The LADA–WOCAT methodologies were tested with local communities and stakeholders in 6 LADA countries (China, Argentina, Cuba, South Africa, Tunisia, Senegal). The aim was to gain a better understanding of the drivers, causes, and impacts of land degradation and SLM in specific land use systems.

The DESIRE methodology compiled information on proven and cost-effective SLM strategies adopted and accepted by local stakeholders. This information was funnelled into the policy arena and disseminated to various other stakeholders such as land users, agricultural advisors, governmental authorities, NGOs, and scientists. Given the DESIRE project's limited duration of 5 years, its methods, experiences, and know-how must now be integrated into long-term programmes to ensure their continued use and ultimate effectiveness. The DESIRE experience showed that the methodological framework is of global relevance while remaining adaptable and flexible enough to take adequate account of diverse local situations. The DESIRE decision support framework is available for further development and application in new projects and programmes, and has already been adapted and applied in a watershed management project in Tajikistan.

Figure 1 illustrates the links and interactions between the various WOCAT–LADA–DESIRE tools and shows how they complement each other at the different levels from local to global. The main purpose of the methodology as a whole is to support decision-making in SLM implementation and to assist monitoring and adaptation of implemented SLM practices. To promote the scaling up of SLM, WOCAT works with key institutions and partners at the local and national level, for example advisory services and implementation projects.

4. POLICY ORIENTED RECOMMENDATIONS

Concerted efforts to standardise documentation and evaluation of SLM are certainly justified in light of the billions of dollars spent annually on implementation. New efforts towards SLM should build on existing knowledge from within a location itself or from similar environments elsewhere. Identifying and assessing scattered knowledge about SLM and making it broadly available requires a standardised and harmonised methodology for comprehensive data collection, knowledge management, and dissemination – such as the one developed by WOCAT, LADA, and DESIRE. Standardised information provides important evidence for users at the local, national, and global levels. Successful use of a shared methodology and its joint adaptation to additional or changing needs requires a strong commitment of all actors involved in SLM. UNCCD could take on a leading role in building up this global movement and bringing all partners together in this joint venture.

SLM has multiple ecological, economic, and social benefits that reach far beyond its potential for reducing land degradation and desertification. SLM also addresses global concerns such as water scarcity, resource use efficiency, energy supply, food security, poverty alleviation, climate change, and biodiversity conservation. When taking into account these multiple benefits, investments in SLM are completely justified and may require funding schemes from private and public sectors, especially when involving small-scale land users and marginalised people.

The DESIRE experience highlighted the importance of close collaboration between scientists and local stakeholders in developing and evaluating SLM options that are tailored to local needs and priorities. Furthermore, it is important to consider local knowledge and traditional approaches to land management alongside the latest technologies emerging from research, and to combine insights from both of these sources.

5. CONCLUSIONS

Standardised and harmonised knowledge management systems such as the WOCAT–LADA–DESIRE methodology build a key pillar for informed decision-making at different scales. An additional important ingredient in successful knowledge management and decision support for scaling up SLM is the joint commitment of all institutions, projects, and actors involved in SLM to build up a harmonised knowledge system and develop user-friendly applications for various users. UNCCD has the mandate to address this challenge and build up such a global platform in collaboration with experienced and committed partners. The WOCAT network pools 20 years of experience and hopes to contribute to this endeavour.

Demonstrating the benefits of linking upstream (on-site) with downstream (off-site) impacts of SLM requires more attention and will be of help in setting priorities for intervention and investments. Further efforts and research is needed to quantify and value ecological, social, and economic impacts of SLM, both on-site and off-site, and to develop methods for valuating ecosystem services (see also Giger et. al 2013). An enabling environment for SLM investments should build on people's and nature's capacities, but also include indirect measures such as credit, market opportunities, legislation, and secure land use rights.

In order to integrate new challenges and meet emerging needs of WOCAT users, tools are constantly developed and adapted. Recent enhancements include tools for improved impact and cost/benefit assessments, cross-scale mapping, climate change adaptation and disaster risk management, and easier reporting on SLM best practices to UNCCD and other national and international partners. User-friendly ways of disseminating knowledge about SLM, such as audiovisual messages directly from land users, are a key opportunity for demonstrating the benefits of SLM to a broader public (Liniger and Harari, 2013).

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